July 31, 2006

John K.Holland
Vice President, Engineering
KABC-TV
500 Circle Seven Drive
Glendale, California 91201

Reference: Letter report on Mt. Wilson RF survey

Dear Mr. Holland:

Introduction

This letter report documents a radiofrequency (RF) ground survey of the Mt. Wilson Communications Site that took place during July 24-26, 2006. The purpose of the survey was to determine whether ambient RF fields at the site comply with rules on human exposure required by the Federal Communications Commission (FCC).[1] In particular, the focus of this study was to address potential public exposure that might occur at the site, outside of restricted, physically controlled areas (i.e., outside of fenced areas having locked gates). The RF field data obtained during this survey are not applicable to occupational exposures that could occur to site workers within controlled environments, including tower climbers, who would be subject to site guidelines and procedures (an RF safety program) for working in RF environments. Such concerns will be addressed in a future study.

The subject survey was accomplished through the on-site support of Alfred E. Resnick, P.E. of the Carl T. Jones Corporation in Springfield, Virginia, who performed all of the field measurements reported here. The measurements were conducted by Mr. Resnick under the supervision, via telephone, of the undersigned, Richard A. Tell. A currently calibrated broadband, isotropic, electric field probe and meter were provided by Richard Tell Associates, Inc. and interpretation and discussion of the data resulting from the survey were performed by the undersigned.

Instrumentation

Measurements were performed with a broadband, isotropic, electric field probe (Narda Microwave Model B8742D, serial number 03002) and a digital RF survey meter (Narda Microwave Model 8715, serial number 01028). These instruments were calibrated at the Narda factory on May 23 and May 18, 2006, respectively. The factory supplied calibration certificates for these instruments are shown in Figures 1 and 2. The

[1] FCC (1997). Federal Communications Commission. "Radiofrequency radiation exposure limits," 47 CFR 1.1310 *et seq*. (Federal Communications Commission, Washington, DC).

B8742D probe is a frequency shaped type of probe that provides for an output, read on the associated meter, of the measured RF field expressed as a percentage of the FCC's maximum permissible exposure (MPE) for the general public. The probe and meter have a minimum reliable indication of approximately 0.6% of the MPE and an upper range of 600% of the MPE. Figure 3 illustrates the factory provided probe correction factors determined in the frequency range of 0.3 MHz to 915 MHz. Calibration data for this probe are shown for both the 2006 and 2005 calibrations to provide some perspective on the long term stability of the probe. Of importance is the observation that the probe's response in the FM broadcast band is approximately 0.7 dB high and, thus, readings of RF fields with dominant contributions in the FM band should be multiplied by the correction factor at 100 MHz, a factor of 0.85, to maximize accuracy of the reading.

Survey Technical Approach

A two phase strategy was followed in performing this survey. The first phase consisted of sweeping the entire Mt. Wilson communications site with the broadband probe, exploring the region for RF fields that approached or exceeded the general public MPE. This process consisted of walking the entire site while moving the probe in an oscillatory up and down fashion and observing for elevated meter readings, i.e., indicated fields approaching or exceeding 100% of the MPE. The second phase included careful measurements of spatially averaged fields at those locations found in phase 1 that were deemed appropriate for further investigation. Compliance with the FCC rules for exposure in uncontrolled environments is interpreted as potential exposure that would result in exceeding the MPE in terms of spatially averaged values over a dimension of approximately six feet in height. In practice, the probe was lowered to ground level and slowly raised to a point approximately six feet above the measurement point on the ground. A probe scan period of approximately 10-12 seconds was used during which the probe was moved at an approximately constant speed making use of the built-in spatial averaging feature of the Model 8715 meter. At the termination of each vertical scan of the probe, the spatially averaged value of field, as a percentage of the MPE, was read from the meter and recorded in field notes.

The FCC MPEs are derived from a presumption of uniform, plane wave exposure over the body. Since most real world RF exposure is never perfectly uniform, spatial averaging is normally used to obtain estimates of the plane wave equivalent power density of a spatially distributed field. But, in addition, RF fields interact with the human body and can be scattered and reflected by the observer performing the RF measurements, thereby further distorting or perturbing the field to be measured. To minimize the influence of these observer induced field perturbations, spatial average measurements were accomplished through a series vertical sweeps of the probe at a measurement point with measurements being made from four different directions, each facing the measurement point in question and spaced 90 degrees apart. In practice, a total of four repeated measurements of the spatially averaged field was made for each of the four directions for a total of 16 spatial averages being taken at each point of interest. The overall average of each set of 16 spatial averages was deemed to be the best estimate of what the unperturbed field would be at the measurement point. For each set of 16 measurements, the standard deviation of the measurements was also calculated as an index of the variability in the measurements and as an aid in understanding the confidence intervals associated with the various spatially averaged field measurements.

Prior to the survey, an email poll was conducted of all the relevant stations at Mt. Wilson by Mr. Jim Rogers, RF Manager, KABC TV, to determine operational status of the many different transmitters. All stations that responded to the poll were operating in accordance with the terms of their main licenses except KLOS, the ABC owned station on 95.5 MHz. The main KLOS antenna had been torn down to upgrade the transmission line feeder system and it was not possible to reassemble the antenna for use in the measurement period. During the survey measurement period, KLOS operated from its auxiliary site at Mt. Harvard and from its auxiliary antenna at Mt. Wilson for a short time. During this study, there was no means to directly verify any other station's operation beyond KABC-TV and KLOS. The survey relied on the responses to the email poll with the presumption that those without a response were operating normally as licensed into their main antenna.

The Mt. Wilson Communications Site

The Mt. Wilson Communications Site is a major broadcast facility that serves the Los Angeles, California, area located approximately at latitude 34º 13' North, longitude 118º 3' West. The site, which runs approximately one mile in an approximate northwest-southeast direction, is shown in Figure 4, a satellite photo of the site. There are some 33 towers at the site, principally used for broadcasting operations. Table 1 lists 18 FM broadcast stations licensed to operate from the site based on information from the FCC FM engineering data base along with frequencies, effective radiated powers (ERPs), and heights of the center of radiation of antennas above ground. Table 2 similarly lists 18 TV stations found in the FCC TV engineering data base as licensed for operation at the site. Table 2 lists channel number, ERP, and antenna heights for both the analog and digital facilities of each station. It should be noted that other stations are licensed to operate from nearby Mt. Harvard located approximately one mile southeast of the center of the Mt. Wilson site. These data were obtained from the FCC's online database on July 27, 2006. The Mt. Wilson Communications Site is also home to many different wireless communications stations such as two-way radio, paging, trunked radio systems, etc. These systems typically operate at much lower power than the broadcast facilities at the site.

RF Survey Findings

A comprehensive sweep of the entire Mt. Wilson Communications Site, west to east and north to south, from the entry to the CBS facilities at the western end of the site to the parking lot at the pavilion on the eastern end, revealed that RF fields were typically in the range of about 10% to 50% of the FCC general public MPE in terms of <u>spatial peak values</u>, with several notable exceptions. Hence, the vast majority of the area exhibited peak fields that would result in smaller values were the fields at those points to be spatially averaged. From the entirety of the two days of walking the site, a total of six specific locations were identified with spatial peak fields that were obviously greater than the vast majority of the fields found throughout the site and that approached or exceeded the MPE and, hence, were deemed worthy of more detailed investigation. It was at these points where detailed, spatially averaged measurements were performed to assess compliance. Two of these six points were inside fenced and controlled access areas although the focus of this survey was potential exposure in uncontrolled environments. Figure 5 portrays the approximate location of each of these six points as well as the location where a test of the repeatability of measuring spatially averaged fields was performed. Figure 5 was taken from a U.S. Forest Service study of the Mt. Wilson Communications Site in August 2003, and annotated with the measurement locations.

Prior to the detailed spatial average measurements, the repeatability of the measurement process was investigated by conducting a series of 10 repeated measurements at a point (point 7 in Figure 5) near the KABC-TV tower on Weathervane Road. The spatially averaged value of field as indicated on the meter was recorded each time without the observer changing position relative to the measurement point identified as point 7. These data resulted in a mean value of 49.3% ± 2.0% of the public MPE. This represents a percentage deviation of 4.1% at the one standard deviation level, a very low value considering the impact of the body on perturbing the incident RF fields. This rather modest variation of the spatially averaged RF field is likely due to the presence of RF fields impinging on the measurement point from many different directions such that, with changes in the body orientation, the spatial averages were not substantially affected since no predominant field was blocked (shielded) from the probe or enhanced due to standing waves off of the body. Figures 6 through 11 are photographs that illustrate the measurement points at which spatial averages were determined. Figure 6 is shows the measurement point (1) in the middle of Video Road near KTLA. Figure 7 is a point (2) on the opposite side of Video Road, near KTLA, at the eastern end of steel plate located in the street. Another spatial average was determined at a point (3) near a collection of razor wire on Video Road opposite the Post Office and the American Tower building. Figure 9 illustrates one of the spatial average measurement locations (point 4), again on Video Road, near a section of railing slightly west of the measurement location shown in Figure 8. While most of the measurements in this survey were exterior to physically controlled environments, two elevated field points (5 and 6) were explored inside the locked gate shown in Figure 10. This gate leads into the KMEX compound where, previously, the FCC had allegedly found spatially averaged RF fields exceeding the general public MPE. Figure 11 shows the location of one of these two elevated field spots (7) near the KMEX transmitter building. A second elevated field point (point 6) was located only a few feet closer to the access gate on his driveway.

An observation formed during the survey was that some highly localized (spatial peak) RF fields that were observed during the first day of measurements could not be found during the second day of measurements. This was despite the observer attempting to use an identical measurement technique in both cases including orientation, body posture, etc. A tentative conclusion in regard to such observations is that the complex scattered fields at the site are subject to many factors and may not result in exactly the same resultant field at any given point over time. For example, the phase relationship of the many different fields could be disturbed simply by the slight movement of scattering surfaces in the vicinity such as vegetation, fencing, etc. It is for this reason that all recorded data were obtained with no one standing closer than approximately 10 feet from the observer. Finally, this observation, which is not unusual in many outdoor environments, is another reason that spatial averaging of fields can result in a more stable indication of the composite RF field at a given location.

Results of the spatially averaged measurement data are listed in Table 4 for the six elevated readings locations. The columns in Table 4 titled ‘Raw’ contain the indicated meter result prior to any processing of the data. In this sense, the values do not reflect any correction for probe response. To address this issue, the temporary use of a Narda Model SRM-3000 spectrum analyzer was used to identify what appeared to be the major contributors to the elevated fields at several of the points. While these data were not recorded, in each case the predominant contributors were found, at these elevated measurement points, to be FM broadcast stations. Based on this finding, it was deemed appropriate to adjust the measured values by correcting the readings using the Narda calibration correction factor of 0.85, applicable in the range of 100 MHz, which was determined from the most recent calibration of the probe in May 2006. The columns in Table 4 titled ‘Corr’ refer to corrected readings obtained by applying a correction factor of 0.85. The bottom two rows of Table 4 provide the calculated overall mean of the 16 corrected spatial average values and the standard deviation of the values. Table 5 summarizes the corrected data for the mean and upper and lower, one standard deviation, confidence intervals for each of the six locations that were investigated in detail for spatial averages. Figure 12 illustrates the final result of this process wherein the overall average of the 16 spatial averages obtained at each of the points (taken to be the best estimate of the unperturbed field) is shown (where the red and green bars join) and the one standard deviation confidence interval is illustrated as a bar with the upper red portion representing the upper one standard deviation of the measurement data above the mean and the lower, green portion of the bar representing the lower one standard deviation of the measurement data below the mean. In this figure, all measurement data was corrected for probe response at 100 MHz. The significance of Figure 12 is that none of the measurements at elevated RF field locations identified at the Mt. Wilson Communications Site, including the confidence interval, reached the 100% of MPE line (dotted red line).

Table 4 shows that the range of spatially averaged RF fields at the six points investigated ranged from 57.4% to 83.9% of the MPE for the public. To provide perspective on the variability of the measurement data, the upper one standard deviation confidence interval was calculated with the greatest value being 90.3% of the public MPE. This provides a very high confidence that RF fields, at the time of the survey, did not exceed the MPE. The greatest <u>spatial maximum</u> RF field found anywhere on the site in the regions examined was at point 6 in Figure 5 with a value of 154.5% of the MPE.

Conclusions

A careful ground survey of RF fields conducted across the entire Mt. Wilson Communications Site showed that RF fields in uncontrolled areas, those points outside of locked, physically controlled areas, were compliant with FCC MPEs for members of the general public, generally, by a wide margin. By and large, a vast proportion of the RF measurements were in the range of 10 to 50% of the MPE with only a few locations exhibiting notably higher field intensities. Based on a finding that most of the site would be compliant with FCC MPEs for the public, detailed measurements were then carried out at six points where the indicated spatial peak value of field approached or slightly exceeded the MPE. These measurements were performed in a manner to reduce the field perturbation caused by the observer and were corrected for the probe's frequency response to match the frequency range of the predominant contributors to aggregate field caused by FM radio stations. This process revealed that none of the measurement points exhibited spatially averaged fields exceeding the FCC MPEs. An absolute maximum value of spatially averaged field of 83.8% of the MPE was found at one point, this being located inside the physically controlled area of the KMEX compound. The range of values for the spatial averages in uncontrolled areas was from 57.4% to 79.6% of the MPE. Further, a statistical analysis of these data revealed that the one standard deviation confidence interval of the measurements, <u>at any of the points</u>, did not exceed 90.3% of the MPE. Based on these findings, it is concluded that RF fields on the ground in any area accessible to the general public comply with the FCC MPE.

Further, while this survey was not focused on controlled access areas, the region inside the KMEX compound was also found to comply with the MPEs at two elevated field points previously identified by the FCC.

These data and the results are not intended to address occupational exposure issues that would be associated with personnel working in certain access controlled regions or aloft on towers. Such considerations should be dealt with in a site RF safety program that will be updated and documented in the future.

Respectfully yours,

Richard A. Tell, President

Table 1. Licensed FM broadcast stations operating from Mt. Wilson Communications Site according to FCC Engineering Database (7-27-2006).

Call sign	Frequency (MHz)	ERP (kW)	Antenna height above ground (m)
KPCC	89.3	0.6	52
KPFK	90.7	110	46
KHHT	92.3	43	49
KCBS-FM	93.1	28.5	242
KZLA	93.9	16	66
KTWV-FM	94.7	58	35
KLOS	95.5	63	112
KLSX	97.1	21	75
KKLA-FM	99.5	10.5	25
KKBT	100.3	5.3	78
KRTH	101.1	51	113
KSCA	101.9	4.8	39
KIIS-FM	102.7	8.0	66
KOST	103.5	12.5	112
KBIG	104.3	65	81
KMZT-FM	105.1	18	63
KPWR	105.9	25	70
KLVE	107.5	29.5	88

Table 2. Licensed TV stations operating from Mt. Wilson Communications Site according to FCC Engineering Database (7-27-2006). Note: Other stations are licensed to operate from nearby Mt. Harvard.

Call sign	Channel		ERP (kW)		Antenna height above ground (m)	
	Analog	Digital	Analog	Digital	Analog	Digital
KCBS-TV	2	60	36.3	469	285	275
KNBC	4	36	43.7	380	153	160
KTLA-TV	5	31	44.7	1000	139	111
KABC-TV	7	53	141	182	137.5	81.4
KCAL	9	43	141	300	129	103
KFTR-TV	46	29	2291	150	98	79
KJLA*	57	49	5000	1000	93	86.2
KTTV	11	65	166	1000	66.7	57
KCOP	13	66	161	371	57	41
KWHY-TV**	22	42	2630	86	55	38
KCET-TV	28	59	2450	190	100.6	87.0
KMEX-TV	34	35	2291	400	98	98
KTBN-TV	40	23	631	50	54	39
KOCE-TV	50	48	2354	1000	98.0	98.0
KAZA-TV	54	47	2323	350	88.4	91.1
KDOC-TV	56	32	2390	398	76.0	98.0
KLCS	58	41	2570	162	50.9	50.9
KXLA	44	51	2340	1000	99	86.2

* Analog facility located on South Mountain

** Digital facility located on Mt. Harvard

Table 3. Raw and corrected data obtained from 16 measures of the spatially averaged RF field at each of six measurement locations exhibiting elevated field approaching or exceeding the FCC MPE for the general public.

Percent of FCC MPE for the general public											
Raw	Corr.	Raw	Corr.	Raw	Corr.	Raw	Corr.	Raw	Corr.	Raw	Corr.
73.7	62.6	88.5	75.2	88.4	75.1	65.6	55.8	78.1	66.4	96.3	81.9
74.8	63.6	89.0	75.7	89.0	75.7	61.6	52.4	78.8	67.0	94.8	80.6
73.3	62.3	93.9	79.8	86.8	73.8	65.6	55.8	76.8	65.3	94.8	80.6
76.5	65.0	91.2	77.5	88.5	75.2	65.0	55.3	77.1	65.5	99.8	84.8
79.8	67.8	108.7	92.4	86.6	73.6	67.1	57.0	73.5	62.5	115.0	97.8
81.2	69.0	97.2	82.6	87.4	74.3	64.2	54.6	73.7	62.6	104.4	88.7
81.3	69.1	107.4	91.3	84.6	71.9	67.0	57.0	77.5	65.9	102.7	87.3
83.7	71.1	105.1	89.3	85.6	72.8	67.1	57.0	78.9	67.1	109.0	92.7
74.0	62.9	95.6	81.3	92.0	78.2	74.0	62.9	73.0	62.1	89.1	75.7
79.5	67.6	94.6	80.4	94.1	80.0	75.6	64.3	74.4	63.2	88.5	75.2
76.0	64.6	99.7	84.7	91.3	77.6	72.7	61.8	76.5	65.0	89.0	75.7
76.5	65.0	90.4	76.8	87.8	74.6	70.6	60.0	76.6	65.1	90.7	77.1
79.1	67.2	85.5	72.7	82.3	70.0	65.4	55.6	73.7	62.6	97.7	83.0
80.5	68.4	85.1	72.3	76.0	64.6	64.3	54.7	74.6	63.4	97.1	82.5
76.0	64.6	81.9	69.6	78.5	66.7	65.2	55.4	72.9	62.0	105.7	89.8
79.4	67.5	84.0	71.4	78.0	66.3	68.8	58.5	72.9	62.0	102.1	86.8
Mean	66.2		79.6		73.1		57.4		64.2		83.8
SD*	2.7		7.1		4.4		3.3		1.9		6.5

*SD is the standard deviation of the 16 corrected values of percent of MPE.

Table 4. Summary of spatially averaged RF survey measurements after correction for probe calibration at the Mt. Wilson Communications Site.

	Readings are percentages of the FCC MPE for the general public in uncontrolled environments.					
	1	2	3	4	5	6
Mean + 1 SD	68.9	86.7	77.5	60.7	66.1	90.3
Mean	66.2	79.6	73.1	57.4	64.2	83.8
Mean – 1 SD	63.5	72.5	68.7	54.1	62.3	77.3

L-3 communications
Narda Microwave-East

Certificate of Calibration

L-3 Communications, Narda Microwave-East, hereby certifies that the referenced instrument has been calibrated by qualified personnel to Narda's approved test procedures.

Furthermore, the instrument meets, or exceeds, all published specifications and the calibration has been performed with test instrumentation that, where applicable, is traceable to the National Institute of Standards and Technology.

Narda's calibration measurements are traceable to the National Institute of Standards and Technology to the extent allowed by the bureau's calibration facilities.

Customer: RICHARD TELL ASSOCIATES INC
COLVILLE, WA 99114

Certificate #: 66883 2

Model #: B8742D

Serial #: 03002

Description: PROBE

PO #: AMEX-TELL

Date Calibrated: 05/23/2006

R.O. #: 66883

Vince Donavan
Manufacturing

Ken Peck
Quality Assurance

This certificate shall not be reproduced, except in full, without written approval from L-3 Communications, Narda Microwave-East

Figure 1. Calibration certificate for the Narda Model B8742D broadband, isotropic, electric field probe following its calibration on May 23, 2006.

L3 communications
Narda Microwave-East

Certificate of Calibration

L-3 Communications, Narda Microwave-East, hereby certifies that the referenced instrument has been calibrated by qualified personnel to Narda's approved test procedures.

Furthermore, the instrument meets, or exceeds, all published specifications and the calibration has been performed with test instrumentation that, where applicable, is traceable to the National Institute of Standards and Technology.

Narda's calibration measurements are traceable to the National Institute of Standards and Technology to the extent allowed by the bureau's calibration facilities.

Customer: RICHARD TELL ASSOCIATES INC
LAS VEGAS, NV 89129

Certificate #: 66883 3

Model #: 8715

Serial #: 01028

Description: METER

PO #: AMEX-TELL

Date Calibrated: 05/18/2006

R.O. #: 66883

Vince Donavan
Manufacturing

Ken Peck
Quality Assurance

Figure 2. Calibration certificate for the Narda Model 8715 digital RF survey meter following its calibration on May 23, 2006.

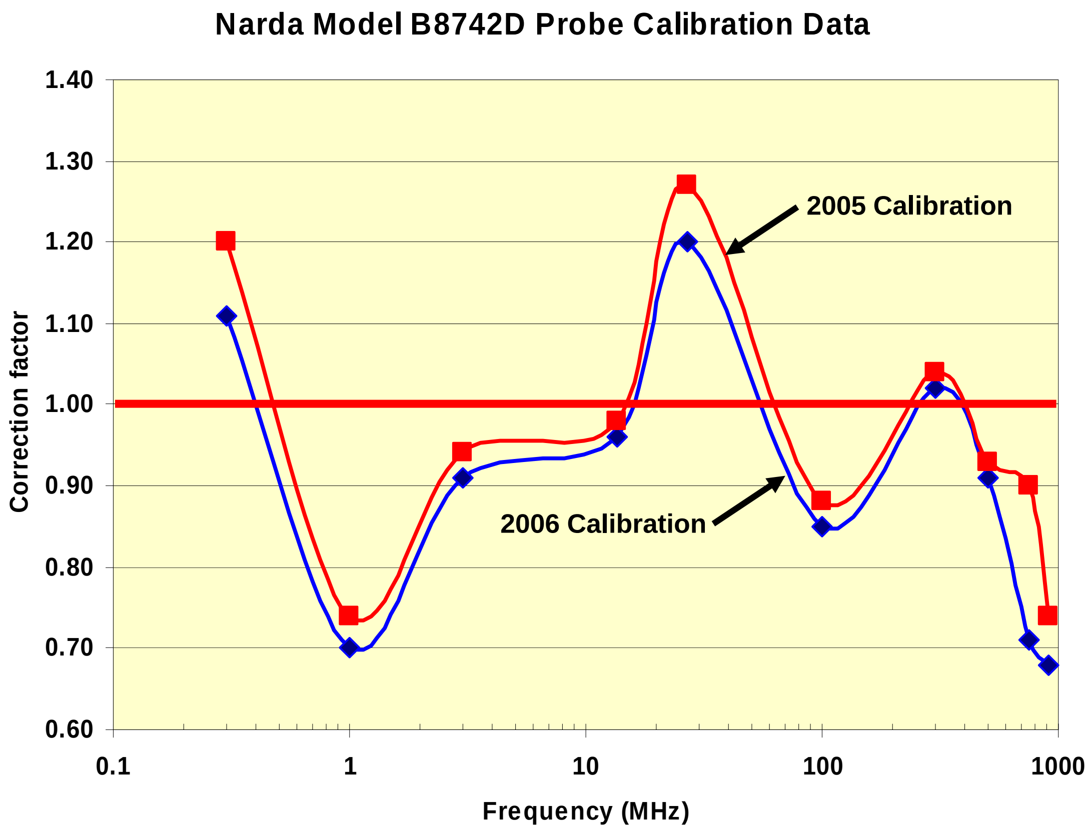

Figure 3. Plot of Model B8742D calibration data for years 2005 and 2006 for frequencies from 0.3 MHz to 915 MHz. The probe was most recently calibrated on May 23, 2006. The 2006 probe correction factor at 100 MHz is 0.85. In 2005, the calibration factor was determined to be 0.88.

Figure 4. Satellite photo of the central portion of the Mt. Wilson Communications Site.

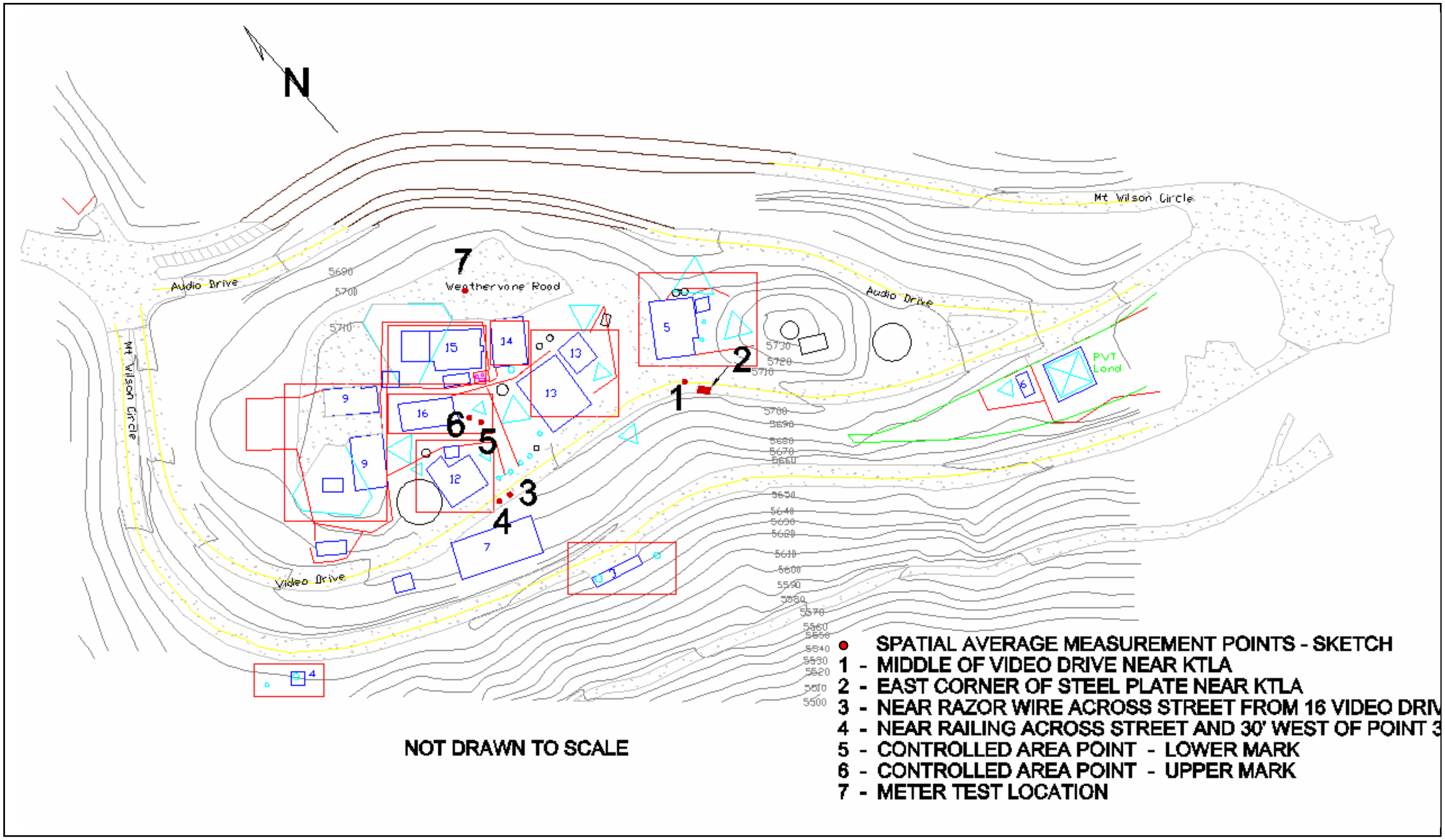

Figure 5. Central area of the Mt. Wilson Communications Site wherein spatially averaged RF field measurements were performed for assessing compliance with the FCC MPEs for the general public. This modified drawing, based on an original CAD drawing created by the U.S. Forest Service, was provided by Carl T. Jones Corporation in Springfield, VA.

Figure 6. Al Resnick, P.E., is shown performing measurements on Video Road at the middle of road at start of newly painted centerline. Spatial averaging was performed here but a spatial peak field found on Tuesday was not observed on Wednesday. The U.S. Post Office, which shares space inside the American Tower Corporation building (large tan building with front overhang with two vehicles parked in front of it) is seen in the background.

Figure 7. Performing measurements of the spatially averaged RF field on Video Road near KTLA at east end of steel plate in street.

Figure 8. Performing measurements of the spatially averaged RF field on Video Road on opposite side of street from Post Office and American Tower site near razor wire.

Figure 9. Performing measurements of the spatially averaged RF field on Video Road near railing, a few steps west of the location shown in Figure 8.

Figure 10. Locked gate area leading to the KMEX facility. Note RF safety alerting signs. This gate leads into a physically controlled environment.

Figure 11. One of two points where FCC had previously found high fields before changes in the KBIG FM antenna. There was a very faint blue painted spot here and a few feet toward the gate the second of the two spots was found. This location is inside the gate shown in Figure 10.

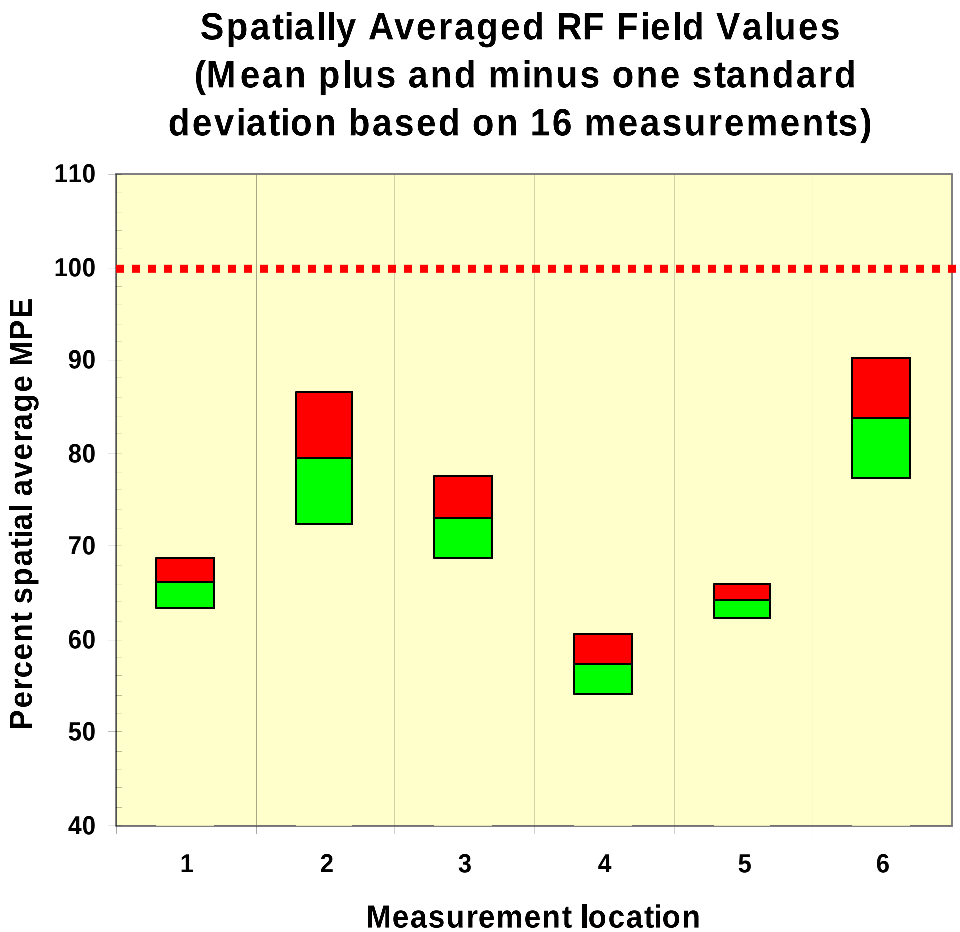

Figure 12. Statistical analysis of spatially averaged RF field measurements at points on the Mt. Wilson Communications Site exhibiting the greatest broadband, measured values of percent of the FCC general public MPE. The midpoint of each vertical bar represents the best estimate of the spatially averaged field, based on 16 measurements. The red portion of the bar represents the upper one standard deviation of the measurement data and the green portion represents the lower one standard deviation. The overall length of bar, from bottom of green to top of red, represents the one standard deviation confidence interval for each set of measurements. The significance of this data presentation is that none of the measurements at elevated RF field locations identified at the Mt. Wilson Communications Site, including the associated confidence interval, reached the 100% of MPE line (dotted red line). All data has been corrected for frequency response of the probe at 100 MHz.